SPECIAL SECTION

New frontiers in human–robot interaction

Interdisciplinary human-centred approaches

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Human-Robot Interaction (HRI) is a quickly growing and very interdisciplinary field. Regular annual conferences relevant to this field are ACM/IEEE International Conference on Human-Robot Interaction (HRI), IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN) and the International Conference on Social Robotics (ICSR). However, these conferences usually target only particular types of papers (e.g. reporting on completed empirical studies or evaluated technical systems), while the field itself is much broader.

As the term HRI suggests, the main focus in research is centred on the interplay between human and robotic agents (Dautenhahn, 2007). There is no official or commonly agreed on definition of HRI, as there are many different ways in which humans can interact with robots (e.g. communication via speech, gestures or symbols). Fong et al (2001) defined HRI as "the study of humans, robots, and the ways they influence each other".

In order to help the field to develop, the symposium series on "New Frontiers in Human-Robot Interaction" was run in 2014 and 2015 in conjunction with the AISB convention. The symposium encourages submissions in a variety of categories, thus giving this event a unique character.

The first symposium on "New Frontiers in Human-Robot Interaction" was held as part of AISB 2009 in Edinburgh, Scotland; the second symposium was run in conjunction with AISB 2010 in Leicester, England. A selection of the best extended papers was published as part of the book series "Advances in Interaction Studies" in the edition titled "New Frontiers in Human-Robot Interaction" (John Benjamins Publishing Company, 2011).

Inspired by the great success of the preceding events and the rapidly evolving field of HRI, we now aim to provide extended versions of three influential papers

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from the symposia of 2014 and 2015 in a Special Section that presents recent findings and challenges in HRI.

Contents of this Special Section

Our goal for this special section was to give selected papers a stage to demonstrate the multidisciplinary and exploratory nature of HRI research, which we hope will encourage fellow researchers to explore innovative means of the interplay between humans and robots. The three articles are extended versions of the original symposium contributions, and were peer-reviewed.

The first article explores how robots that have non-anthropomorphic bodies (e.g. as a result of specific task requirements) can express emotional states via movement. To this end, the authors present a set of case studies investigating which emotional expressions can be best conveyed via body motion and velocity changes performed by differently shaped robots. This exploratory research demonstrates the potential of bio-neutral movements for emotion representation in HRI.

The second article is a methodological contribution exploring how robot-mediated interviews (RMI) might facilitate communication with children (e.g. who have been victims of child abuse). In order to investigate the potential benefits of an approach based on RMI, experts including police officers, intermediaries, educational specialists and health care specialists were interviewed to identify their needs and views of such a system. The article presents detailed findings and valuable insights resulting from these interviews and thereby contributes to future research and technology development in this domain.

The third article presents a long-term study in which 70 robots were placed into people's homes for a period of up to six months. This study adds to the so far limited long-term findings in HRI research. Results show that user evaluations first dropped before rising again once people gain experience with the robot and get familiar with it over a longer period of time. Thereby, this study highlights the importance of long-term HRI studies in natural settings such as people's homes, as observations based on such longitudinal research often differ from people's one-time lab encounters with robots.

Taken together, this special section contributes a collection of thought-provoking studies that outline the transformational impact HRI can have on our perceptions of emotions, communications styles, and everyday life in general. We aim to continue the "New Frontiers in HRI" symposia in conjunction with the AISB convention to further foster exploratory and innovative research in this exciting research field.

References

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Biographical notes

Maha Salem co-organized the Third and Fourth International Symposium on "New Frontiers in Human-Robot Interaction" at AISB 2014 and AISB 2015 respectively. She further co-organized the "Workshop on Speech and Gesture Production in Virtually and Physically Embodied Conversational Agents" held in conjunction with the 14th ACM International Conference on Multimodal Interaction (ICMI 2012). She regularly serves as a program committee member for various workshops and conferences in the research area of HRI and multimodal interaction.

Astrid Weiss co-organized workshops on a variety of HRI-related topics at the following conferences: RO-MAN2008, HRI2009, HRI2011, ICSR2013, and HRI2014. She was in the Program Committee of the past three "New Frontiers in Human-Robot Interaction" symposia. Moreover, she is regularly member of Program and Organizing Committees related to HRI research. In 2010 she edited a Special Issue on *Social Acceptance and Societal Impact in Human-Robot Interaction for the* International Journal of Social Robotics (Co-Editor Prof. Manfred Tscheligi). Currently she is editing Special Issue on *Taking Care of Each Other: The Future of Social Companion Robots* for the International Journal on Social Robotics (Co-Editor Dr. Tamara Lorenz). Moreover, she is an associate editor for the Journal on Human-Robot Interaction.

Paul Baxter most recently co-organized a workshop on Cognitive Architectures for HRI at the HRI2014 conference. He also regularly serves as a programme committee member for workshops and conferences in the areas of HRI, Cognitive Robotics, and Artificial Intelligence.